

IN THE CLAIMS

Claim 1 (currently amended): A method for cleaning one or more surfaces of an object, the method comprising:

spraying a liquid through at least one jet onto at least one surface of at least one object to be cleaned; and

insonifying the liquid, with a focusing acoustic transducer, as it is being sprayed, producing so as to produce longitudinal and shear waves which propagate into the object itself with an acoustic transducer so that a frequency and a power of the insonification is kept below a threshold above which cavitation occurs with an acoustic power divided by an area (acoustic power/area), which is a function of an amount of electric power applied to the focusing acoustic transducer at a given frequency to result in the liquid with an insonified power density of at least 5 kW / cm² without substantial cavitation occurring on a surface of an object being cleaned.

Claim 2 (cancelled)

Claim 3 (original): The method according to claim 1, wherein the liquid being sprayed is insonified at a frequency greater than or equal to 1 MHz.

Claim 4 (currently amended): The method according to claim 1 [[2]], wherein the liquid being sprayed is insonified at a frequency greater than or equal to 1MHz.

Claim 5 (original): The method according to claim 1, further comprises:

moving the object in a direction substantially opposite relative to a direction of the spray so as that any particulates cleaned from the at least one surface are cleaned in a direction opposite the direction in which the object is moving.

Claim 6 (original): The method according to claim 1, further comprises:

moving the jet in a direction substantially opposite to a direction of the spray so as that any particulates cleaned from the at least one surface are cleaned in a direction of the spray.

Claim 7 (original): The method according to claim 1, wherein the step of spraying a liquid includes spraying a liquid at an oblique angle relative to the at least one surface of an object to be cleaned.

Claim 8 (original): The method according to claim 1, wherein the step of spraying a liquid spray includes spraying a liquid which is de-ionized water.

Claim 9 (currently amended): The method according to claim 1, wherein the step of insonifying the liquid includes producing an acoustical wave imparted onto the surface of the one or more objects being cleaned in a directions away from the focusing acoustic transducer.

Claim 10 (currently amended): The method according to claim 1 [[2]], wherein the step of moving the object includes moving the object to be cleaned using a conveyor belt.

Claim 11 (currently amended): The method according to claim 1 [[2]], wherein the step of spraying a liquid includes spraying a liquid onto at least one surface of at least one object which is made from ceramic.

Claim 12 (original): The method according to claim 10, wherein the step of spraying a liquid includes spraying a liquid onto at least one surface of at least one object which is made from alumina/TiC.

Claim 13 (currently amended): The method according to claim 1 [[2]], wherein the step of spraying a liquid includes spraying a liquid onto at least one surface of at least one object which is a hard disk drive head.

Claim 14 (cancelled)

Claim 15 (currently amended): An apparatus for cleaning objects using insonified liquids comprising:

a carrier that moves for moving one or more objects along a processing assembly line for cleaning at least one surface of the objects; and
a focusing acoustic transducer with at least one jet for spraying a liquid onto the surface of the objects to be cleaned, wherein the liquid is insonified while it is being sprayed ~~so that a frequency and a power density of the insonification is kept below a threshold above which cavitation occurs and the focusing acoustic transducer provides an acoustic power divided by an area (acoustic power/area) that is a function of an amount of electric power applied to the focusing acoustic transducer at a given frequency to result in the liquid with an insonified power density of at least 5 kW / cm² without substantial cavitation occurring on a surface of an object being cleaned.~~

Claim 16 (cancelled)

Claim 17 (currently amended): The apparatus for cleaning objects according to claim 15, wherein the focusing acoustic transducer is operated at a frequency greater than or equal to 1 MHz.

Claim 18 (cancelled)

Claim 19 (original): The apparatus for cleaning objects according to claim 15, wherein the object is made from ceramic.

Claim 20 (original): The apparatus for cleaning objects according to claim 15, wherein the object is made from alumina/TiC.

Claim 21 (original): The apparatus for cleaning objects according to claim 15, wherein the object is a hard disk drive head (HDDH).

Claim 22 (original): The apparatus for cleaning objects according to claim 15, wherein the object is a hard disk drive head (HDDH) with a plurality of surfaces, and wherein the carrier is configured to be rotatable so at least four surfaces are cleaned by the liquid being sprayed from the jet.

Claim 23 (original): The apparatus for cleaning objects according to claim 15, wherein the carrier comprises two strips of material that are pressed against each of two opposite surfaces of the object allowing access of multiple surfaces to be cleaned by the insonified liquid sprayed from the jet.

Claim 24 (currently amended): The apparatus for cleaning objects according to claim 15, wherein the focusing acoustic transducer is rotatably mounted so that to vary at least one of a longitudinal component and a shear wave component of an acoustic wave produced by the focusing acoustic transducer.

Claim 25 (currently amended): The apparatus for cleaning objects according to claim 15, wherein the focusing acoustic transducer is mounted on a robotic arm to permit a direction that the jet for spraying a liquid onto the surface of the one or more objects to be adjusted relative to the surface of the one or more objects.

Claim 26. (currently amended) An apparatus for cleaning objects using insonified liquids comprising:

a carrier for moving one or more objects along a processing assembly line for cleaning at least one surface of the objects; and

an focusing acoustic transducer with at least one jet for spraying a liquid onto the surface of the objects to be cleaned, and the focusing acoustic transducer provides an acoustic power divided by an area (acoustic power/area) that is a function of an amount of electric power applied to the focusing acoustic transducer at a given frequency to result in the liquid with an insonified power density of at least 5 kW / cm² wherein the liquid is insonified while it is being sprayed so that a frequency and a power density of the insonification is kept below a threshold below which shock waves occurs.